{In Archive} Fw: Final Technical information for Goliad Aquifer Exemption

William Honker to: Stacey Dwyer, Philip Dellinger, Ray Leissner 07/13/2012 05:08 PM
Cc: Wren Stenger, Ann Codrington

From: William Honker/R6/USEPA/US
To: Stacey Dwyer/R6/USEPA/US, "Philip Dellinger" <Dellinger.Philip@epamail.epa.gov>, Ray Leissner/R6/USEPA/US
Cc: Wren Stenger/R6/USEPA/US, Ann Codrington/DC/USEPA/US
Archive: This message is being viewed in an archive.

Stacey/Phil - how long will it take us to look thru all the stuff UEC sent us?

Bill Honker
Acting Director, Water Quality Protection Division
EPA Region 6
Ofc 214-665-3187
Cell 214-551-3619

Sent by EPA Wireless E-Mail Services

From: Harry Anthony [hanthony@uraniumenergy.com]
Sent: 07/13/2012 09:54 PM GMT
To: William Honker; Sam Coleman; Charles Maquire <charles.maguire@tceq.texas.gov>; Ann Codrington
Cc: Andy Barrett <andy@thebarrettfirm.com>; Ben Klein <klein@heatherpodesta.com>
Subject: Final Technical information for Goliad Aquifer Exemption

Dear Bill,

Attached are the remaining files further detailing the Goliad clay thicknesses by sand throughout the entire area of review, and hydraulic gradient supporting the directionally of water flow from West to East.

I'd like to propose that we follow up with a call on Monday afternoon after your review of the information to conclude any lingering questions... Hopefully we can finalize everything over a phone call negating the need to meet in Austin Wednesday morning.. But if that is what is needed, we are prepared to sit down with TECQ and EPA at that time.

Thank you, and have a good weekend..

Harry L. Anthony, IV PE | Chief Operating Officer - Director

Uranium Energy Corp.
Direct: 361-888-8235 ext 224
Fax: 361-888-5041
Cell: 361-522-8880

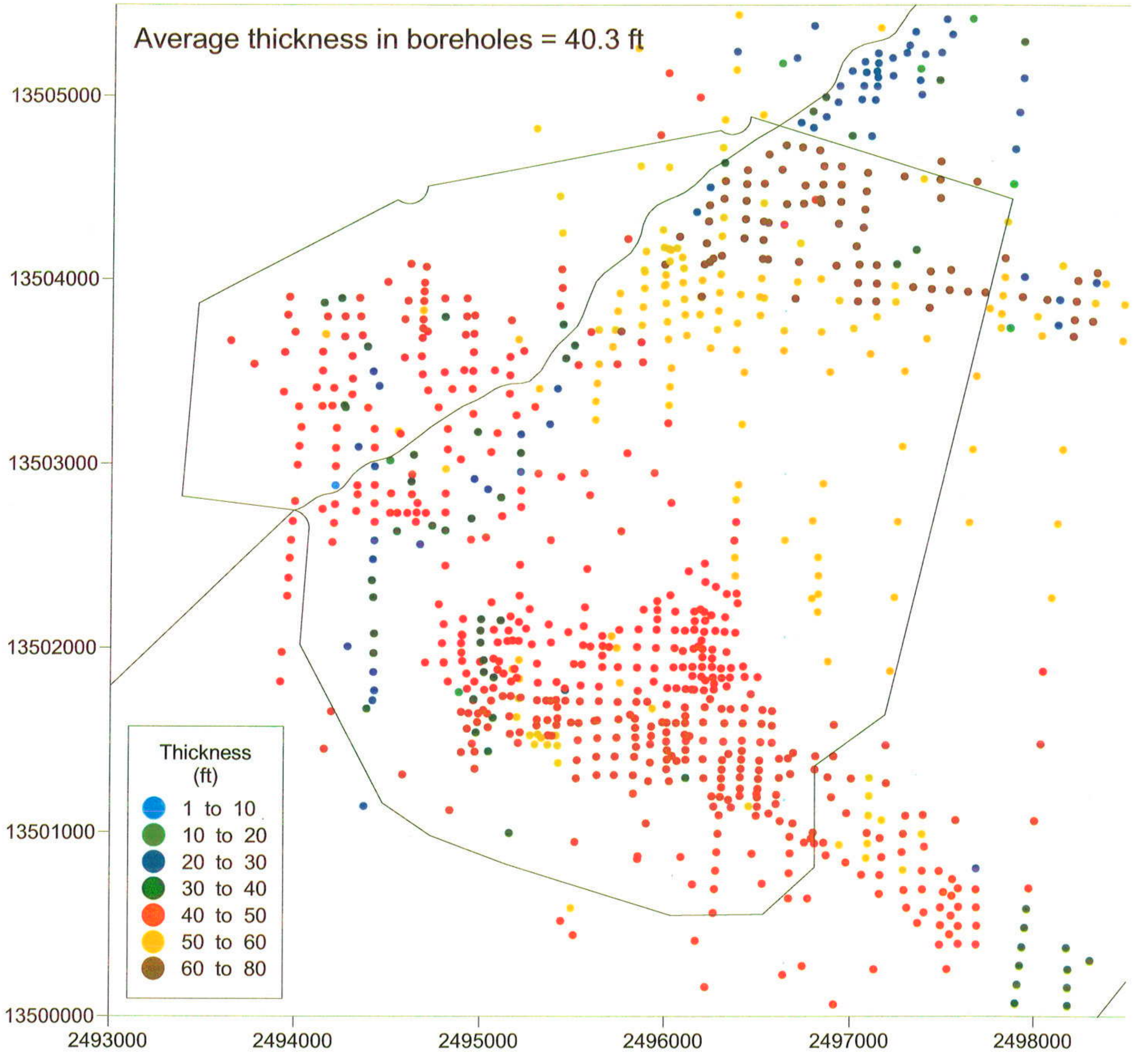
NYSE MKT: UEC | www.uraniumenergy.com

Goliad Clay Thk and Hydraulic Gradient Details West to East June 13-2012.pdf Goliad GW Flow and Clay Tkness June 13-2012.pdf

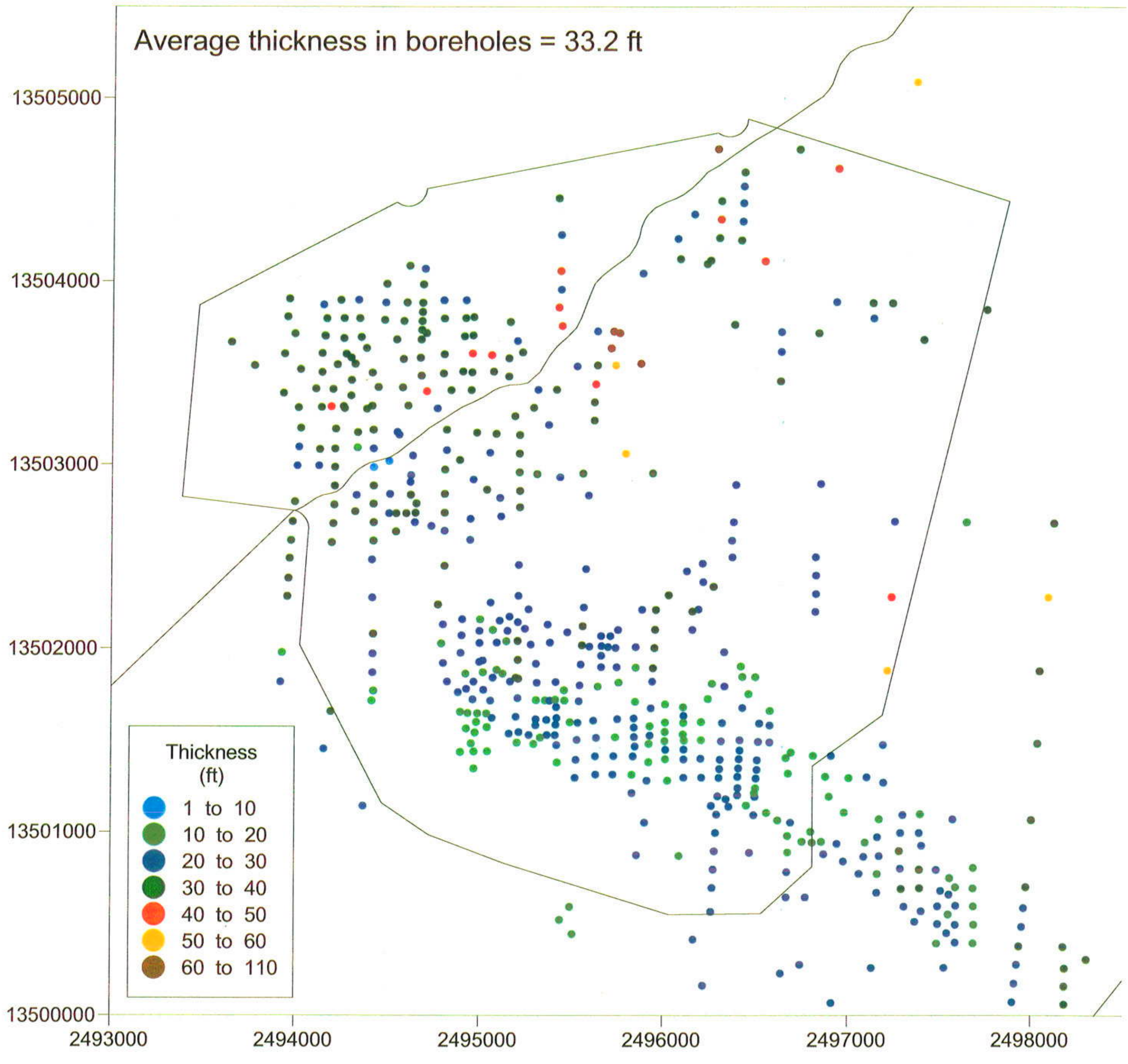
00768.pdf

Goliad Up Gradient Wells June 13-2012.pdf

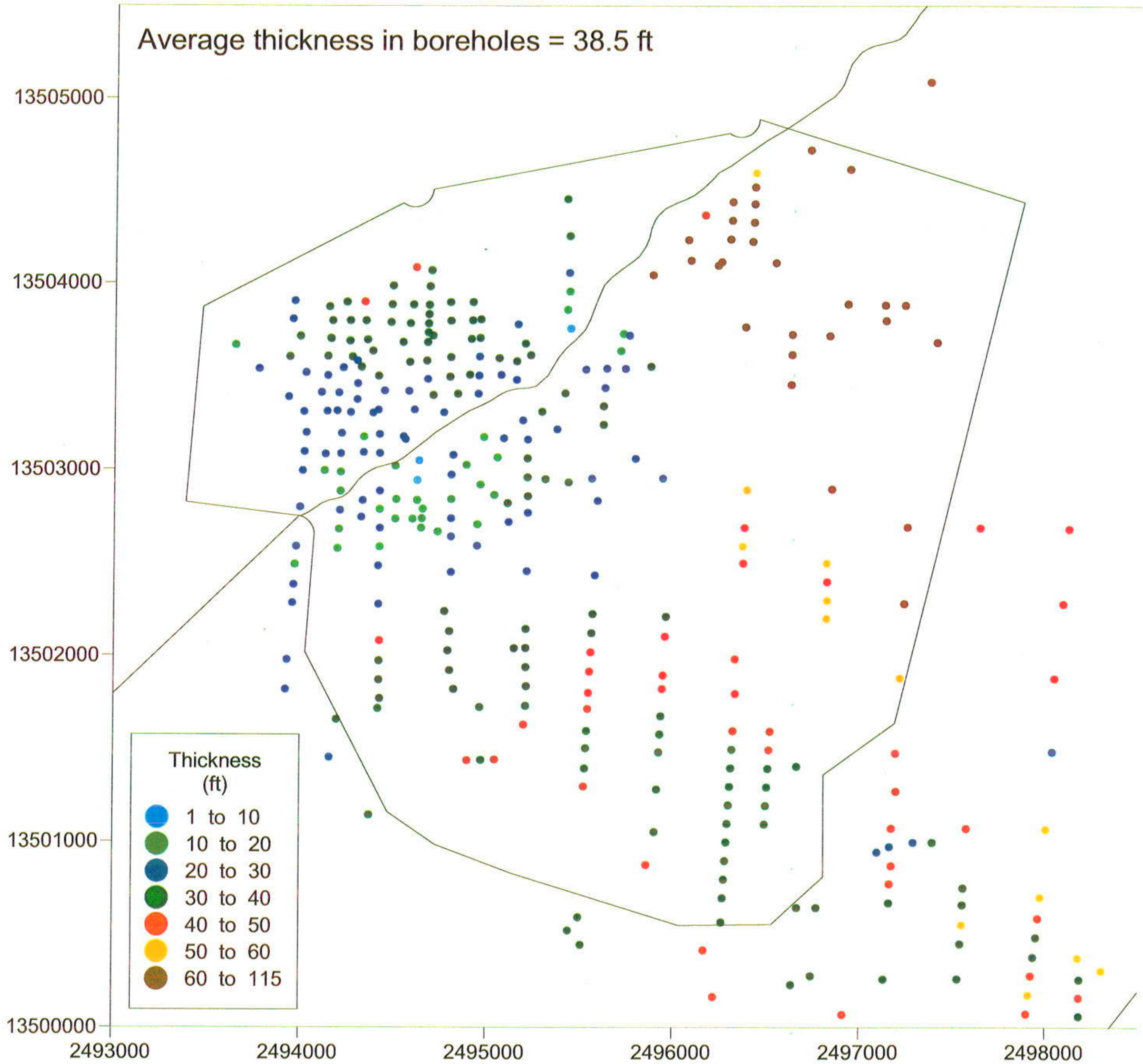
AB Clay Thickness in Boreholes



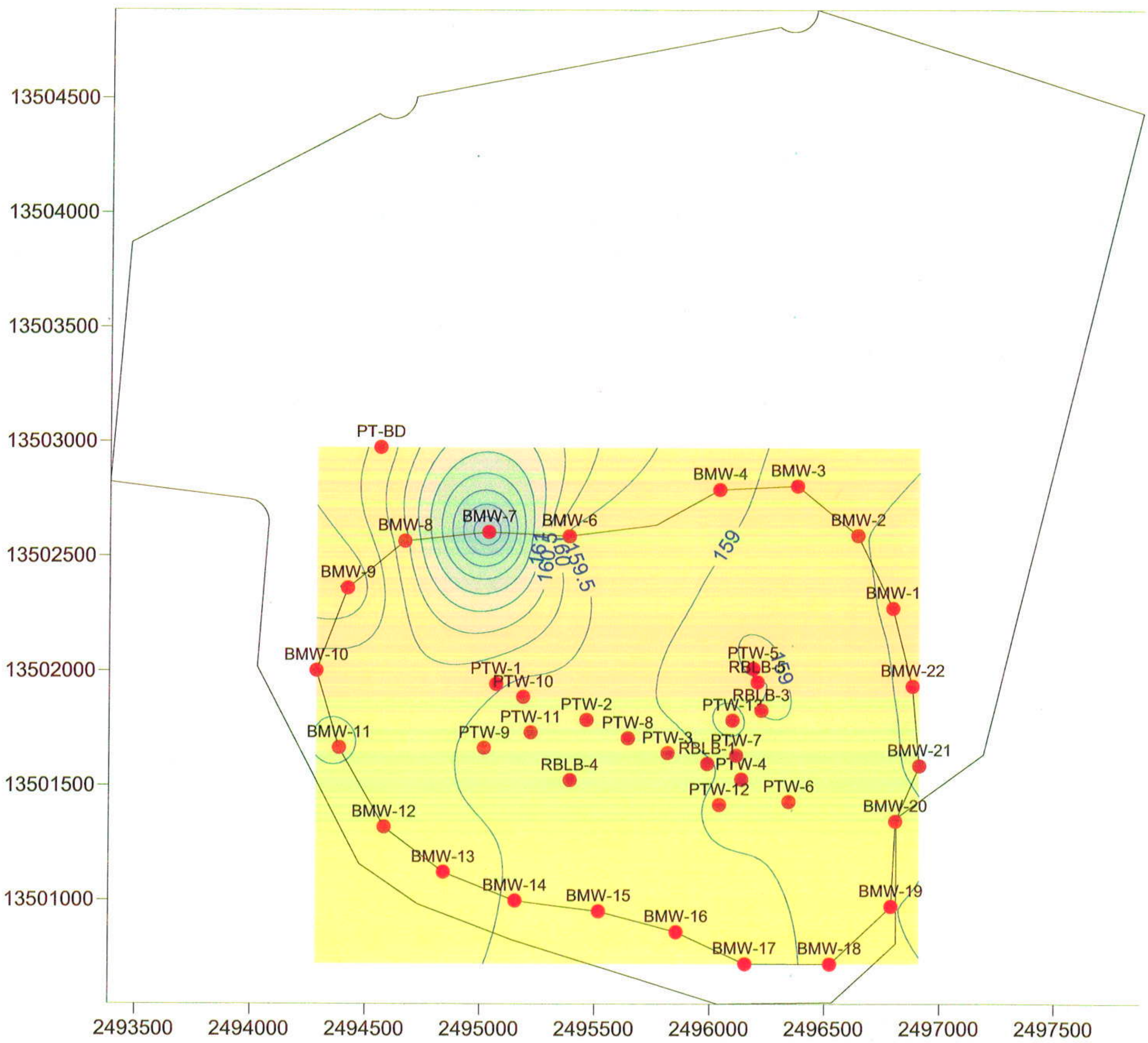
BC Clay Thickness in Boreholes



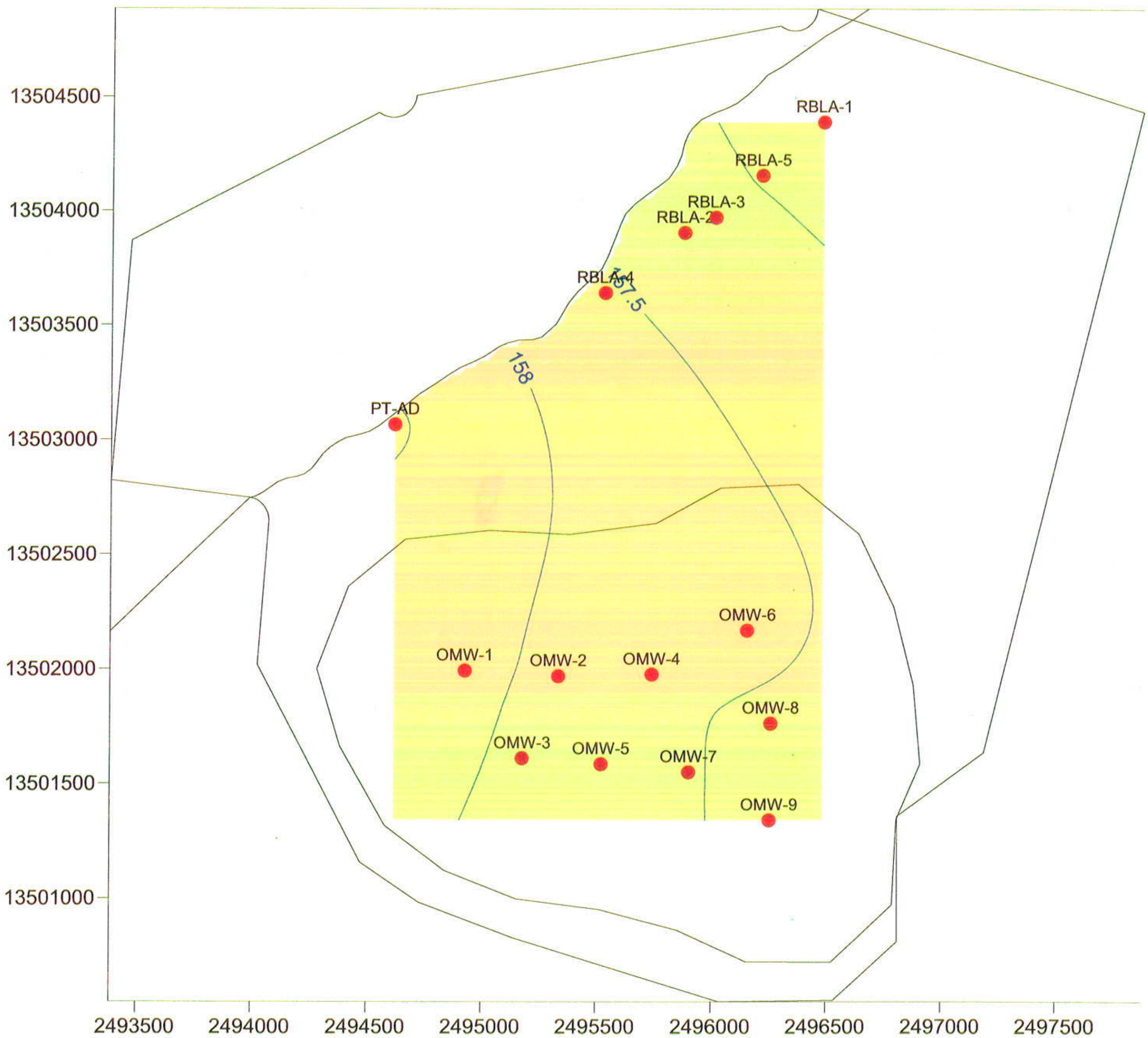
CD Clay Thickness in Boreholes



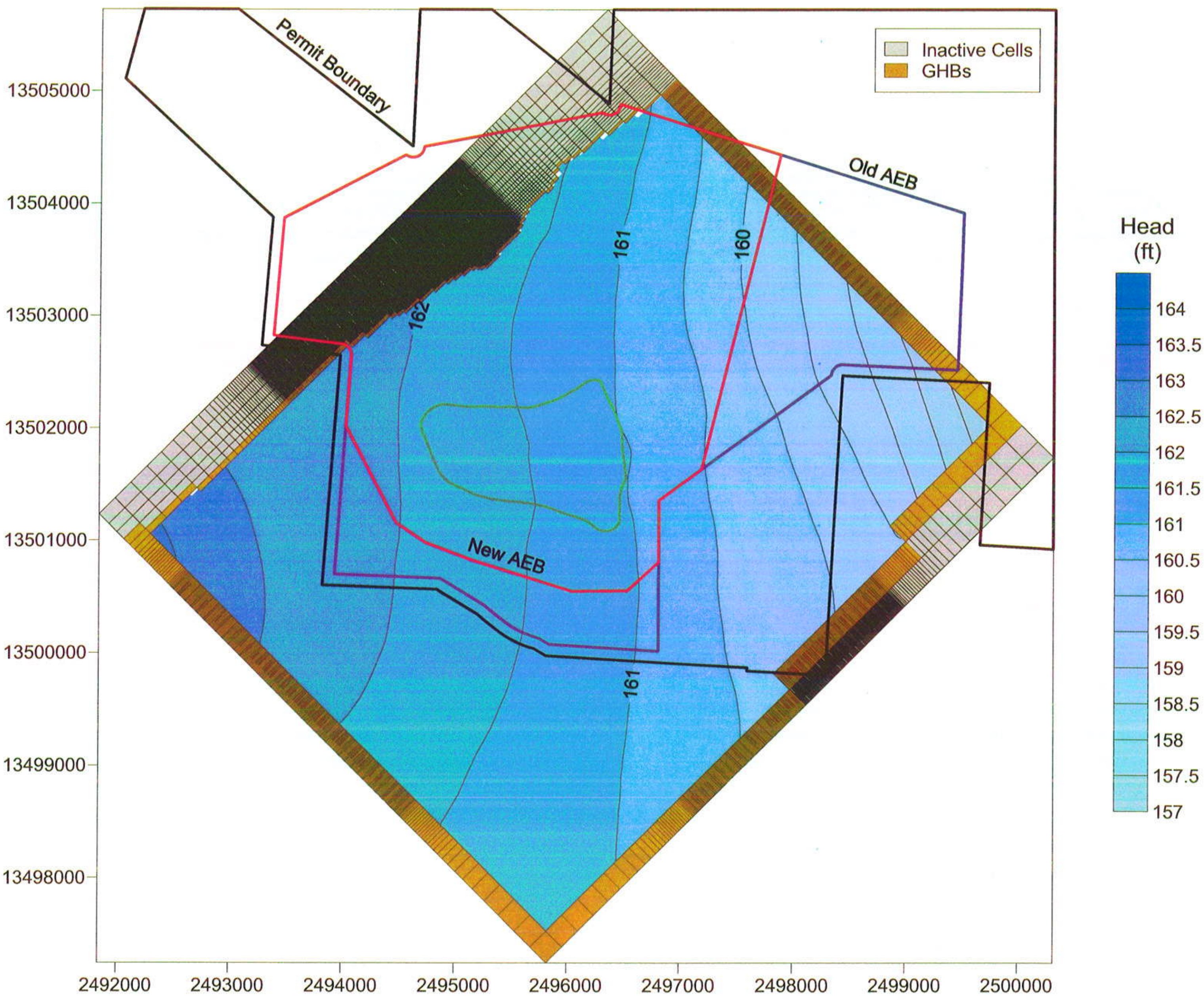
February 2012 B-Sand (graben wells) Water Levels



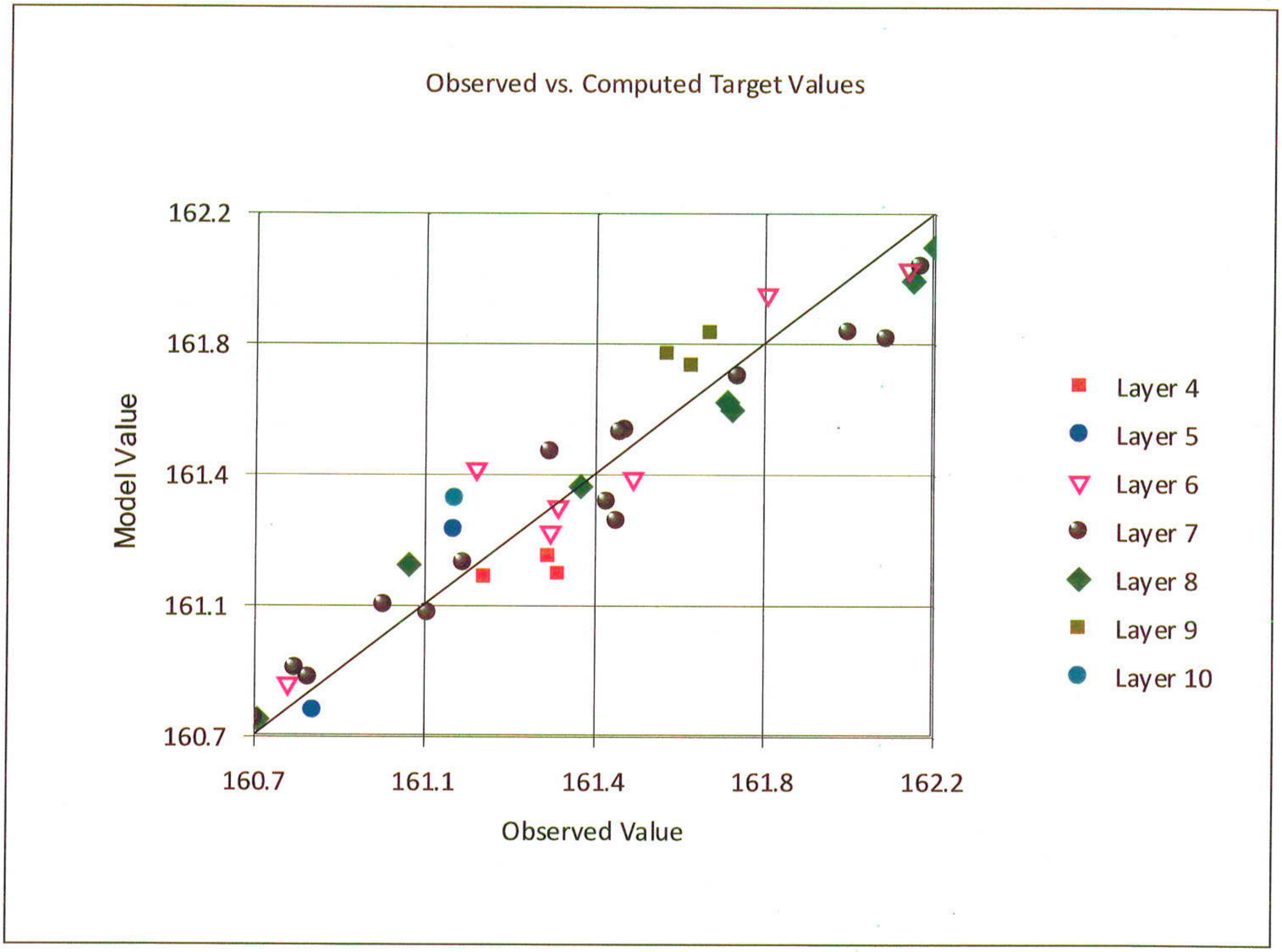
February 2012 A-Sand (graben wells) Water Levels



B-Area Production Model
Steady-State Heads



B-Area Production Model Calibration



Residual Mean	0.00
Res. Std. Dev.	0.13
Sum of Squares	0.64
Abs. Res. Mean	0.11
Min. Residual	-0.28
Max. Residual	0.25
Range in Target Values	1.51
Std. Dev./Range	0.09

{In Archive} Fw: Final Technical information for Goliad Aquifer Exemption
William Honker to: Stacey Dwyer, Philip Dellinger, Ray Leissner 07/13/2012 05:08 PM
Cc: Wren Stenger, Ann Codrington

From: William Honker/R6/USEPA/US
To: Stacey Dwyer/R6/USEPA/US, "Philip Dellinger" <Dellinger.Philip@epamail.epa.gov>, Ray Leissner/R6/USEPA/US
Cc: Wren Stenger/R6/USEPA/US, Ann Codrington/DC/USEPA/US
Archive: This message is being viewed in an archive.

Stacey/Phil - how long will it take us to look thru all the stuff UEC sent us?

Bill Honker
Acting Director, Water Quality Protection Division
EPA Region 6
Ofc 214-665-3187
Cell 214-551-3619

Sent by EPA Wireless E-Mail Services

From: Harry Anthony [hanthony@uraniumenergy.com]
Sent: 07/13/2012 09:54 PM GMT
To: William Honker; Sam Coleman; Charles Maquire <charles.maguire@tceq.texas.gov>; Ann Codrington
Cc: Andy Barrett <andy@thebarrettfirm.com>; Ben Klein <klein@heatherpodesta.com>
Subject: Final Technical information for Goliad Aquifer Exemption

Dear Bill,

Attached are the remaining files further detailing the Goliad clay thicknesses by sand throughout the entire area of review, and hydraulic gradient supporting the directionally of water flow from West to East.

I'd like to propose that we follow up with a call on Monday afternoon after your review of the information to conclude any lingering questions... Hopefully we can finalize everything over a phone call negating the need to meet in Austin Wednesday morning.. But if that is what is needed, we are prepared to sit down with TECQ and EPA at that time.

Thank you, and have a good weekend..

Harry L. Anthony, IV PE | Chief Operating Officer - Director

Uranium Energy Corp.
Direct: 361-888-8235 ext 224
Fax: 361-888-5041
Cell: 361-522-8880

NYSE MKT: UEC | www.uraniumenergy.com

Goliad Clay Thk and Hydraulic Gradient Details West to East June 13-2012.pdf Goliad GW Flow and Clay TKness June 13-2012.pdf

Goliad Up Gradient Wells June 13-2012.pdf

Groundwater Flow and Aquitards

Slides 1 through 3 show the thickness at boreholes for the clay layers between the A-sand and the B-sand, the B-sand and the C-sand, and the C-sand and the D-sand, respectively. Clay thicknesses were calculated for each borehole that had both upper and lower contacts for the clay. Picks for the top and base elevations for each sand intersected by a borehole were determined by UEC geologists from borehole logs. The average thickness of the clay between the A-sand and the B-sand is about 40 feet. For the clay between the B-sand and the C-sand, it is about 33 feet, and between the C-sand and the D-sand about 39 feet. These clays serve as an effective confining unit between the sand layers.

Slide 4 shows a contour plot of hydraulic head for the B-sand for February 2012. All B-sand wells within the graben area were used to develop the contour plot. As can be seen from the data, flow directions within the graben are generally west to east. Well BMW-7 appears to have a survey elevation error since it measures from about four to six feet above all of the other wells. Slide 5 shows a similar contour plot of hydraulic head for the A-sand in February of 2012. Consistent with the B-sand, head contours define a generally west to east hydraulic gradient.

Simulated head results for the B-Area Production Model under steady-state conditions are shown in Slide 6. The model is bounded by the northwest and southeast faults. Groundwater flow in the model is west to east. Slide 7 shows calibration results and statistics for the model, which indicate that the model is well calibrated.

{In Archive} Fw: Final Technical information for Goliad Aquifer Exemption

William Honker to: Stacey Dwyer, Philip Dellinger, Ray Leissner 07/13/2012 05:08 PM
Cc: Wren Stenger, Ann Codrington

From: William Honker/R6/USEPA/US
To: Stacey Dwyer/R6/USEPA/US, "Philip Dellinger" <Dellinger.Philip@epamail.epa.gov>, Ray Leissner/R6/USEPA/US
Cc: Wren Stenger/R6/USEPA/US, Ann Codrington/DC/USEPA/US
Archive: This message is being viewed in an archive.

Stacey/Phil - how long will it take us to look thru all the stuff UEC sent us?

Bill Honker
Acting Director, Water Quality Protection Division
EPA Region 6
Ofc 214-665-3187
Cell 214-551-3619

Sent by EPA Wireless E-Mail Services

From: Harry Anthony [hanthony@uraniumenergy.com]
Sent: 07/13/2012 09:54 PM GMT
To: William Honker; Sam Coleman; Charles Maquire <charles.maguire@tceq.texas.gov>; Ann Codrington
Cc: Andy Barrett <andy@thebarrettfirm.com>; Ben Klein <klein@heatherpodesta.com>
Subject: Final Technical information for Goliad Aquifer Exemption

Dear Bill,

Attached are the remaining files further detailing the Goliad clay thicknesses by sand throughout the entire area of review, and hydraulic gradient supporting the directionally of water flow from West to East.

I'd like to propose that we follow up with a call on Monday afternoon after your review of the information to conclude any lingering questions... Hopefully we can finalize everything over a phone call negating the need to meet in Austin Wednesday morning.. But if that is what is needed, we are prepared to sit down with TECQ and EPA at that time.

Thank you, and have a good weekend..

Harry L. Anthony, IV PE | Chief Operating Officer - Director

Uranium Energy Corp.
Direct: 361-888-8235 ext 224
Fax: 361-888-5041
Cell: 361-522-8880

NYSE MKT: UEC | www.uraniumenergy.com

Goliad Clay Thk and Hydraulic Gradient Details West to East June 13-2012.pdf Goliad GW Flow and Clay Tkness June 13-2012.pdf

Goliad Up Gradient Wells June 13-2012.pdf

Up-Gradient Wells

The region from which a pumping well produces water is called the capture zone. The capture zone for a well has a parabolic shape, opening in the up gradient direction. The down gradient limit of the capture zone is defined by the stagnation point, the point where the groundwater flow rate in the aquifer and flow rate to the well have equal magnitude, but opposite direction. For a uniform flow field, the down gradient distance from the well to the stagnation point can be determined using the equation shown in Figure 9(b) of Cohen et al (1997). The pumping rate of the well, transmissivity of the aquifer, and hydraulic gradient of the aquifer are needed for this calculation.

The base case pumping rate for a rural domestic well was selected based upon county specific data. Initially, we contacted Kevin Kluge of the Texas Water Development Board (Board) to attempt to get a state sanctioned estimate of rural/domestic per capita groundwater use. Mr. Kluge stated that the Board does not calculate such a per capita estimate. Instead, the Board estimates per capita use based upon municipal use and municipal population. Their number for Goliad County is 119 gpd/person.

We estimated the average household size in Goliad County, by consulting the Goliad County website at http://www.goliadcc.org/index.php/re-location-info.html. There it is reported that the average Goliad County household has 2.6 people. Taking 2.6 people multiplied by 119 gpd/person, one gets a daily use of 309.4 gpd/household. This equates to a pumping rate of 41.4 ft^3/day.

The transmissivity of the aquifer, the product of the aquifer hydraulic conductivity and the aquifer thickness, was based on an average hydraulic conductivity determined from the pump tests conducted at the site and a thickness of 36 feet, the smallest average thickness for any of the sands (Table 6.1 of the Mine Permit Application). UEC used minimum thickness since reducing thickness increases the distance to the stagnation point. The gradient used for the base case was an average value developed from the September 2008 water level measurements for the B-sand production area monitor well ring.

Under the base case conditions, the capture zone for a pumping well would extend less than 16 feet in the down gradient direction. We evaluated three additional scenarios: 1) five times the average rural domestic pumping rate, 2) the 5th percentile B-sand gradient, and 3) hydraulic conductivity reduced by 50%. These changes increase the down gradient distance of the stagnation point, but the stagnation point remains far up gradient of the proposed aquifer exemption boundary for all up gradient wells. Results are presented in the following table.

Scenario	Pumping Rate	Hydraulic Conductivity	Sand Thickness	Transmissivity	Gradient	Stagnation Point
	Q (ft3/d)	K (ft/d)	b (ft)	T (ft2/d)	i (ft/ft)	(ft)
Average conditions (B-sand)	41.366	19.2	36	691.2	0.00061	15.61

Five times average water use / household	206.83	19.2	36	691.2	0.00061	78.07
5th percentile graben gradient	41.366	19.2	36	691.2	0.00035	27.21
Hydraulic conductivity reduced by 50%	41.366	9.6	36	345.6	0.00061	31.23

Reference

Cohen, Robert M., James W. Mercer, Robert M. Greenwald, and Milovan S. Beljin, 1997. Design Guidelines for Conventional Pump-and-Treat Systems, EPA/540/S-97/504, September 1997